# Particle-volume-fraction effect on width of re-shocked Richtmyer-Meshkov mixing

Qi Wu*, Yousheng Zhang†, Baoqing Meng†, Yipeng Shi* and Baolin Tian†

The effect on re-shocked Richtmyer-Meshkov mixing by particles is ubiquitous in practical engineering problems. A primary factor of the particle-laden RM flows is the particle volume fraction $\alpha_p$, which has been studied in the re-shocked RM flow only under dilute particles.[1] However, the systematical study of the particle-volume-fraction effect on re-shocked RM mixing is still lacking, especially on the most important feature of the mixing width (MW). In our work, three-dimensional implicit large eddy simulation (ILES) is adopted and the well-verified compressible multiphase particle-in-cell method[2] is utilized to address the problem. Six cases with different $\alpha_p$ are examined, and we present the following key findings: MWs will grow faster before re-shock as $\alpha_p$ rises, which attributes to additional vorticity production in the mixing layer resulting from gas-particle coupling. Besides, the presence of the particle phase introduces a continuous drag on the gas phase, resulting in a delay in the time at which re-shock occurs. Moreover, the growth rates of MWs after re-shock decrease as $\alpha_p$ increases. These findings highlight the importance of particle volume fration of particles on re-shocked RM flows, and have potential applications on controlling RM mixing.

*LTCS, Peking University, Beijing 100871, PR China
†Institute of Applied Physics and Computational Mathematics, Beijing 100094, PR China

[1]Schulz et al., *Phys. Fluids* **25**, 114105 (2013).
[2]Tian et al., *J. Comput. Phys.* **418**, 109602 (2020).